

WEST Search History

DATE: Wednesday, September 03, 2003

<u>Set Name</u>	<u>Query</u>	<u>Hit Count</u>	<u>Set Name</u>
side by side			result set
<i>DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=OR</i>			
L11	l9 and L10	67	L11
L10	expancel	761	L10
L9	l4 and L8	289	L9
L8	l6 and l7	7445	L8
L7	polyurethane	270819	L7
L6	compressible	70706	L6
L5	l2 same l3 same l4	16	L5
L4	microsphere	25621	L4
L3	copolymer	545867	L3
L2	vinylidene adj fluoride	16463	L2
L1	acrylate adj vinylidene adj fluoride adj copolymer	3	L1

END OF SEARCH HISTORY

WEST Search History

DATE: Thursday, September 04, 2003

Set Name Query

side by side

Hit Count Set Name

result set

DB=USPT; PLUR=YES; OP=OR

L3	11 same L2	25	L3
L2	microsphere or microcapsule or microballoon	24662	L2
L1	vinylidene adj fluoride	8582	L1

END OF SEARCH HISTORY

WEST

Generate Collection

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L1: Entry 2 of 3

File: PGPB

Aug 29, 2002

PGPUB-DOCUMENT-NUMBER: 20020119323
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20020119323 A1

TITLE: Compressible polyurethane layer and process for the preparation thereof

PUBLICATION-DATE: August 29, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Weinert, Johann	Kerpen		DE	

APPL-NO: 10/ 014446 [PALM]
DATE FILED: December 14, 2001

RELATED-US-APPL-DATA:

Application is a non-provisional-of-provisional application 60/277934, filed March 23, 2001,

FOREIGN-APPL-PRIORITY-DATA:

COUNTRY	APPL-NO	DOC-ID	APPL-DATE
DE	100 62 628.9	2000DE-100 62 628.9	December 15, 2000

INT-CL: [07] C08 J 9/13, B32 B 9/04

US-CL-PUBLISHED: 428/423.1; 521/60

US-CL-CURRENT: 428/423.1; 521/60

ABSTRACT:

The compressible polyurethane layer having outer and inner surfaces on or for rotation-symmetrical bodies consists of polyurethane and contains expanded and/or non-expanded, but expandable thermoplastic hollow spheres.

Questions & Answers

- 1: How large are **EXPANCEL®** microspheres?
- 2: What are **EXPANCEL®** microspheres made of?
- 3: How do **EXPANCEL®** microspheres work?
- 4: How can I make **EXPANCEL®** microspheres expand?
- 5: What grade/type of **EXPANCEL®** microsphere is the one that I need?
- 6: Can I use **EXPANCEL®** microspheres even if there is no heating involved in my process?
- 7: What types of **EXPANCEL®** microspheres are available?
- 8: How can I find out what type of **EXPANCEL®** microsphere will be suitable for my product?
- 9: What type of **EXPANCEL®** is used in different systems?
- 10: Within what temperature range do **EXPANCEL®** microspheres expand?
- 11: Where are **EXPANCEL®** microspheres produced?
- 12: What is required of the matrix when **EXPANCEL®** microspheres are expanded in-situ?
- 13: Is it necessary to heat the product if I have added **EXPANCEL®** WU or DU to it?
- 14: Can I get technical support from **Expancel?**
- 15: In what type and size of packaging are **EXPANCEL®** microspheres delivered?
- 16: Do I need special mixing equipment or special mixing techniques to add **EXPANCEL®** microspheres to my product?
- 17: Can I stop the expansion at some point and later continue the expansion?

1: How large are EXPANCEL® microspheres?

A: Unexpanded EXPANCEL® microspheres (EXPANCEL® WU or DU) have a diameter between 6 and 40 µm, depending on grade. When unexpanded EXPANCEL® microspheres are heated they expand to between 20 and 150 µm in diameter.



2: What are EXPANCEL® microspheres made of?

A: EXPANCEL® microspheres have two major components, the shell and the blowing agent. The blowing agent inside the shell is usually isobutane or isopentane. The shell is a copolymer of some monomers, e.g. vinylidene chloride, acrylonitrile and methylmethacrylate.



3: How do EXPANCEL® microspheres work?

A: An unexpanded EXPANCEL® microsphere consists of a thermoplastic shell encapsulating a hydrocarbon. When this thermoplastic shell is heated it softens and at the same time the pressure of the hydrocarbon increases. This causes the shell to stretch and expand in much the same way as a balloon. There is a difference in that when the heat is removed, the shell stiffens and the microsphere remains in its new expanded form.



4: How can I make EXPANCEL® microspheres expand?

A: When you have mixed EXPANCEL® microspheres into your product it's just a matter of heating your product to a temperature at which the microspheres start expanding. This can be anywhere between 100 and 200 °C depending on the grade.



5: What grade/type of EXPANCEL® microsphere is the one that I need?

A: This depends on whether or not your product will be heated after the microspheres have been added, and if so, to which temperature and for how long. It also depends on if your formulation is waterborne, solvent-based or dry. Is your product subjected to

shear forces or pressure after the addition of **EXPANCEL®** microspheres? Are there any solvents present in your product? What is the main property you hope to improve by using **EXPANCEL®** microspheres in your product? This question is best answered by our sales staff when you contact us.



6: Can I use EXPANCEL® microspheres even if there is no heating involved in my process?

A: Yes, you would then use the pre-expanded types **EXPANCEL® WE** or **DE**.



7: What types of EXPANCEL® microspheres are available?

A: **EXPANCEL®** microspheres are delivered dry or wet (containing water):

EXPANCEL® WU, wet unexpanded

EXPANCEL® DU, dry unexpanded

EXPANCEL® slurry, a dispersion of about 40% microspheres

EXPANCEL® MB, master batch with about 65% microspheres

EXPANCEL® WE, wet expanded

EXPANCEL® DE, dry expanded



8: How can I find out what type of EXPANCEL® microsphere will be suitable for my product?

A: Contact us, see this section.



9: What type of EXPANCEL® is used in different systems?

A: In general **EXPANCEL® WE** and **WU** are used in products where there is already water present, while **DU** and **DE** are used in products that have no water. **EXPANCEL® MB** is used in extrusion and injection moulding. **WU** and **DU** are used where the process includes heating, while **WE** and **DE** are used in processes that do not include heating. **EXPANCEL® slurry** is used in the production of paper and board.



10: Within what temperature range do EXPANCEL® microspheres expand?

A: This depends on the grade of **EXPANCEL®** microsphere and on the time of heating.



11: Where are EXPANCEL® microspheres produced?

A: EXPANCEL® WU, DU, WE, DE, MB and slurry are produced by Expancel at Stockviksverken, Sundsvall Sweden. EXPANCEL® DE and WE are also produced by Expancel Inc. in Duluth, Georgia, USA.

12: What is required of the matrix when EXPANCEL® microspheres are expanded in-situ?

A: The matrix must be able to flow or be plastically deformed at the temperature at which EXPANCEL® microspheres start to expand.

13: Is it necessary to heat the product if I have added EXPANCEL® WU or DU to it?

A: Usually you have to heat it, but in some cases where there is an exothermic reaction involved, the energy released by this reaction increases the temperature of the product sufficiently to expand the microspheres.

14: Can I get technical support from Expancel?

A: Yes, both our sales staff and technical staff are there to help you get the most out of EXPANCEL® microspheres. We can help you choose the proper grade of EXPANCEL® for your product as well as give advice on equipment for adding EXPANCEL®.

15: In what type and size of packaging are EXPANCEL® microspheres delivered?

A: EXPANCEL® WU and DU are delivered in fibre drums containing 50-70 kg, or in Big-Bags, containing 500 kg.

EXPANCEL® WE is delivered in 10 kg bags and boxes with 10 bags.

EXPANCEL® DE is typically delivered in boxes with four 5 kg bags. There are variations depending on grade.

EXPANCEL® slurry is delivered in 1.000 litre containers.

EXPANCEL® MB is delivered in 20 kg bags.

16: Do I need special mixing equipment or special mixing techniques to add EXPANCEL® microspheres to my

product?

A: In general you can use the same equipment and mixing procedure as you would if you did not use **EXPANCEL®** microspheres. When **EXPANCEL® WU, DU** and **slurry** is used, excessive heat must be avoided during mixing because it could cause premature expansion.

17: Can I stop the expansion at some point and later continue the expansion?

A: It is possible to stop and continue expansion several times as long as the matrix is not changed in any way that would inhibit the expansion of the microspheres.